

In a young *Halmaturus Bennettii*, measuring (without the tail) 85 millims., the *os tympanicum* forms a ring broken through before and behind, just as in the developed state in the Monotremata. The anterior and stronger part of this ring divides into a fork above, and embraces Meckel's process from without and behind, whilst beneath it fits exactly with a convexity upon the inner surface of the ascending portion of the lower jaw, and with a smooth articular surface into the upper concave surface of the incurved angle of the jaw.

I find the conditions exactly similar in older examples of *Didelphys aurita*, only that the tympanic bone is already separated by a thin layer of connective tissue from the angle of the lower jaw.

From this the peculiar characteristic formation of the angle of the lower jaw in the lower Mammalia is at once explained; its inwardly projecting portion corresponds, as a provisional articular process, with the permanent inner articular process of Birds.

It is possible, and appears to me even probable, that the malleus in Birds contributes to the formation of the quadrate bone, as in Birds there is still a second outer articular cavity, no part corresponding to which exists in the Marsupialia. This will probably find its explanation among the Monotremata, as in *Ornithorhynchus* a peculiar external process of the lower jaw occurs, corresponding in position to the outer articular process in Birds; and I hope soon to be able to make further communications upon this point.—*Monatsber. Berl. Akad. der Wiss.* Nov. 21, 1867, pp. 725-729.

*On the Tympanic Bone and Ossicles of the Ear in the Monotremata, in connexion with the question of the interpretation of the Quadrate Bone in Birds.* By Professor W. PETERS.

My hope of obtaining very young Monotremes, and by their investigation solving, as I expected, the question of the homology of the quadrate bone of birds with the tympanic bone, has not been fulfilled; but yet, from the examination of a not completely developed skull of *Tachyglossus hystrix*, for which I am indebted to the kindness of Dr. Möbius, and from that of a still younger skull of *Ornithorhynchus* belonging to the Zoological Museum of Berlin, some results have been obtained which seem to me worth communicating.

The *os tympanicum* of *Tachyglossus* is, indeed, at a later period amalgamated with the long process of the malleus, but the boundary between them may still be distinctly recognized. It then forms a half ring, the thinnest middle part of which is applied directly to the *os pterygoideum*, and at the spot which lies nearest to the apex of the long process of the malleus it is but little widened. But in the young specimen now before me, this entire region is the broadest of the ring, and moreover it is furnished on its lower free surface with a slight convexity, which corresponds to the inner concavity of the small angle of the lower jaw, and which, in all probability, and judging from the conditions in the Marsupials, was previously united like a joint with this cavity. The extraordinary size of the long process of the malleus is likewise remarkable; in proportion to the

entire size of the animal it shows a more gigantic development than in any other mammal. Exteriorly the malleus unites by an articulation with the *squama temporalis* at a point which appears to be depressed by the externally projecting hinder extremity of the zygomatic bone\*. Nevertheless this union does not take place directly, but by means of a small acutely triangular ossicle, widening from before backwards, which, on careful examination, proves to be nothing but a portion of the incus which is amalgamated with the malleus†.

But if the malleus be examined on its upper surface, a distinct suture appears to be present in places at the point where the long process unites with the malleus; and this leads us to expect that in very young animals a dividing suture will be found here.

At any rate it is of importance to the question of the interpretation of the quadrate bone in birds, that in the full-grown *Tachyglossus* there is a bone, consisting originally of three or four separate pieces, which effects an articular union of the *squama temporalis* with the *os pterygoideum* and (at an earlier period) with the lower jaw.

In *Ornithorhynchus*, in which the incus remains separate throughout life, the *os tympanicum* unites directly by the malleus with the *squama temporalis*; nevertheless it is to be observed that the incus situated above it is likewise united with the *squama temporalis*, which is the cause that, in this genus, it is difficult to remove the auditory ossicles in connexion.

Here, therefore, we see, in the Monotremata, that a bone composed of two or more pieces presents the same articular connexions as the *os quadratum* in birds, that by these pieces, through the *os tympanicum*, is effected the union with the *os pterygoideum* and the inner angular process of the lower jaw, whilst that with the *squama temporalis* is effected by the malleus and incus, or by the incus alone. The question still remains to be solved, in the young Monotremata, whether the long process of the malleus (occurring as a distinct bone, and, in part, representing a part of the *os tympanicum* of the higher Mammalia) at any time forms a condyle corresponding to the outer cavity of the articular process of the lower jaw in birds.—*Monatsber. Berl. Akad. der Wiss.* Dec. 5, 1867, pp. 779–781.

\* To me the interpretation of this peculiar bone, which attaches itself like a scale upon the *squama temporalis*, given by Laurillard and Duvernoy seems to be quite correct, although it is remarkable that it assists in the formation of the cranial cavity, which, indeed, induced Mr. Owen not to agree in this interpretation, without, however, giving a better one (Monotremata, Cycl. of Anat. & Phys. p. 7). I have been able to investigate this bone upon a very beautiful dissected skull, most kindly communicated to me by Professor Keferstein of Göttingen.

† That this small intermediate bone, which effects the articular union with the *squama temporalis*, is a portion of the incus was first made plain to me by a kind communication from my friend Flower, whom I induced to investigate this subject, and who wrote to me that he had found in a young skull of *Tachyglossus* the incus, which had previously been entirely overlooked, and which would only subsequently be amalgamated with the malleus, but was then distinctly to be recognized.

*Leucodore calcarea.*

To the Editors of the *Annals and Magazine of Natural History.*

GENTLEMEN,—Allow me to draw your attention, and that of your readers, to the figure of *Leucodore calcarea* appended to my paper last month. I have to apologize very greatly for its erroneous and sketchy appearance. The setæ are by no means correctly indicated, whilst the great branchial cirri, which curve over the back, are omitted altogether. This is owing to illness, which prevented me from seeing to the proofs of the plate. The figure given by Dr. Johnston originally, I believe, in this Magazine, and republished in the 'B. M. Catalogue of Worms,' is a very fair representation of his *Leucodore ciliata*, which I must refer to as a correction of the erroneous one in my plate. Since my paper did not deal with the morphological peculiarities of *Leucodore*, the figure was only of secondary importance.

I am, Gentlemen, truly yours,  
E. RAY LANKESTER.

*On the Growth of the Stem of Fontinalis antipyretica.*

By Professor H. LEITGEB.

The apical growth of this moss takes place by repeated divisions of a three-sided apical cell. The divisional walls are parallel to the lateral surfaces of the apical cell. The spiral of division is as often directed to the right as to the left. The segments cut off from the apical cell by the divisional walls are arranged, in accordance with their origin, in three longitudinal series, and at first incline towards each other at an angle of about  $70^{\circ}$ . Each segment is divided by a longitudinal wall into an outer and an inner part. The inner part of the segment, which subsequently becomes horizontal (the stem-part of the segment), displays in general the same development as the segments in the roots of many vascular Cryptogamia and in the stem of *Equisetum*. It is divided by the sextant-wall into sextants, in the larger of which an inner cell is cut off by a tangential wall. From the stem-part of the segment is formed the widely cellular, axile tissue of the stem.

The outer part of the segment (the leaf-part) partially retains its inclined position. It divides by a horizontal wall into the *acroscopic* and the *basiscopic basilar* portion. The former grows out into the free leaf-surface, a two-edged apical cell being formed in it. From the basiscopic basilar pieces the buds are developed. Hence *each bud and the leaf standing above it belong to the same segment*. One wall of the apical cell of the bud is always turned towards the apex of the parent shoot. The segmental spiral of the bud is always antidromous to the segmental spiral of the parent shoot. The tangential growth of the basiscopic basilar piece always remains much behind that of the acroscopic portion.—*Anzeiger der Akad. der Wiss. in Wien*, February 13, 1868, pp. 43–44.